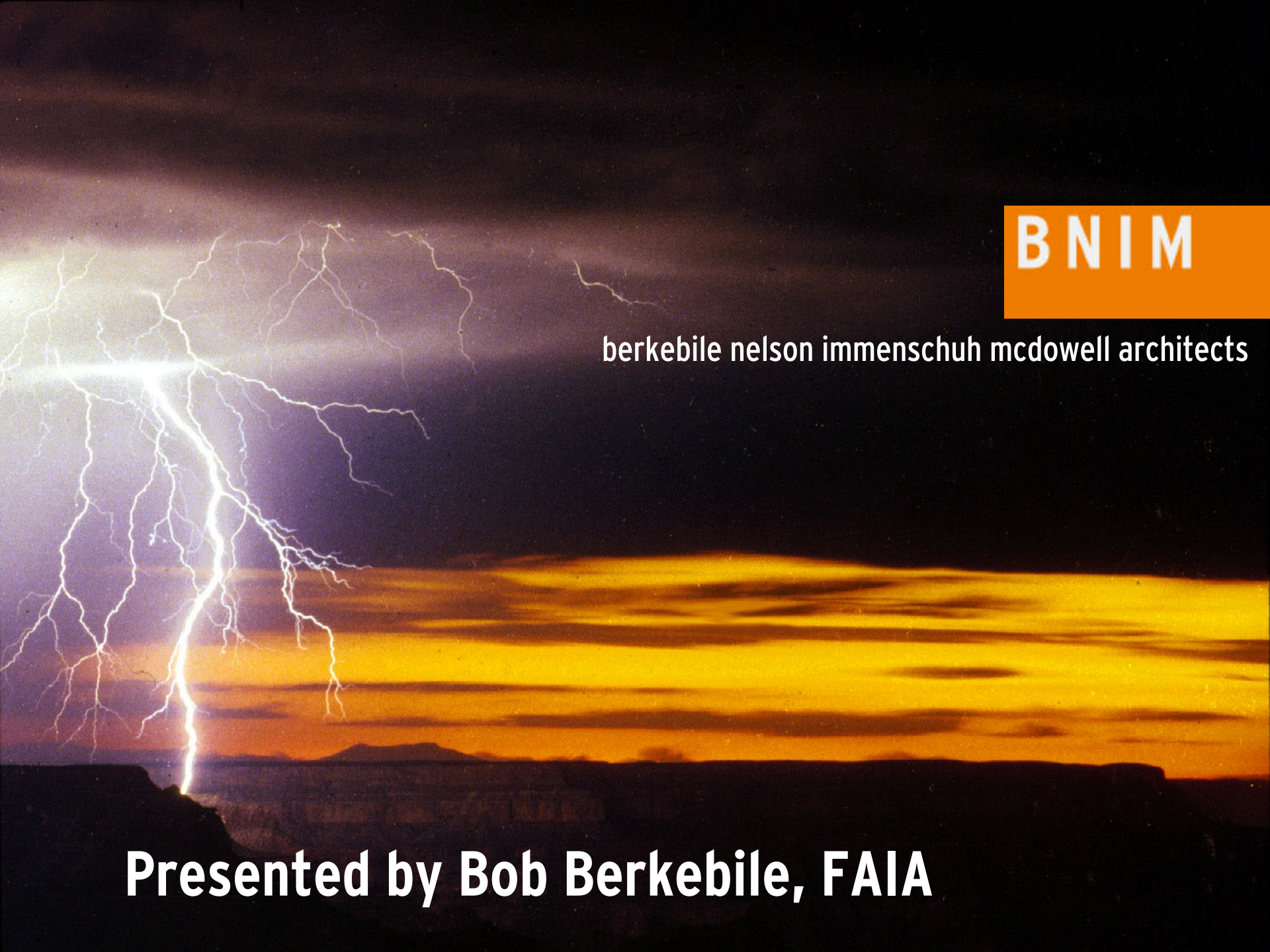
New Horizons

SOLUTIONS FOR THE 21st CENTURY

an architects journey toward restorative design

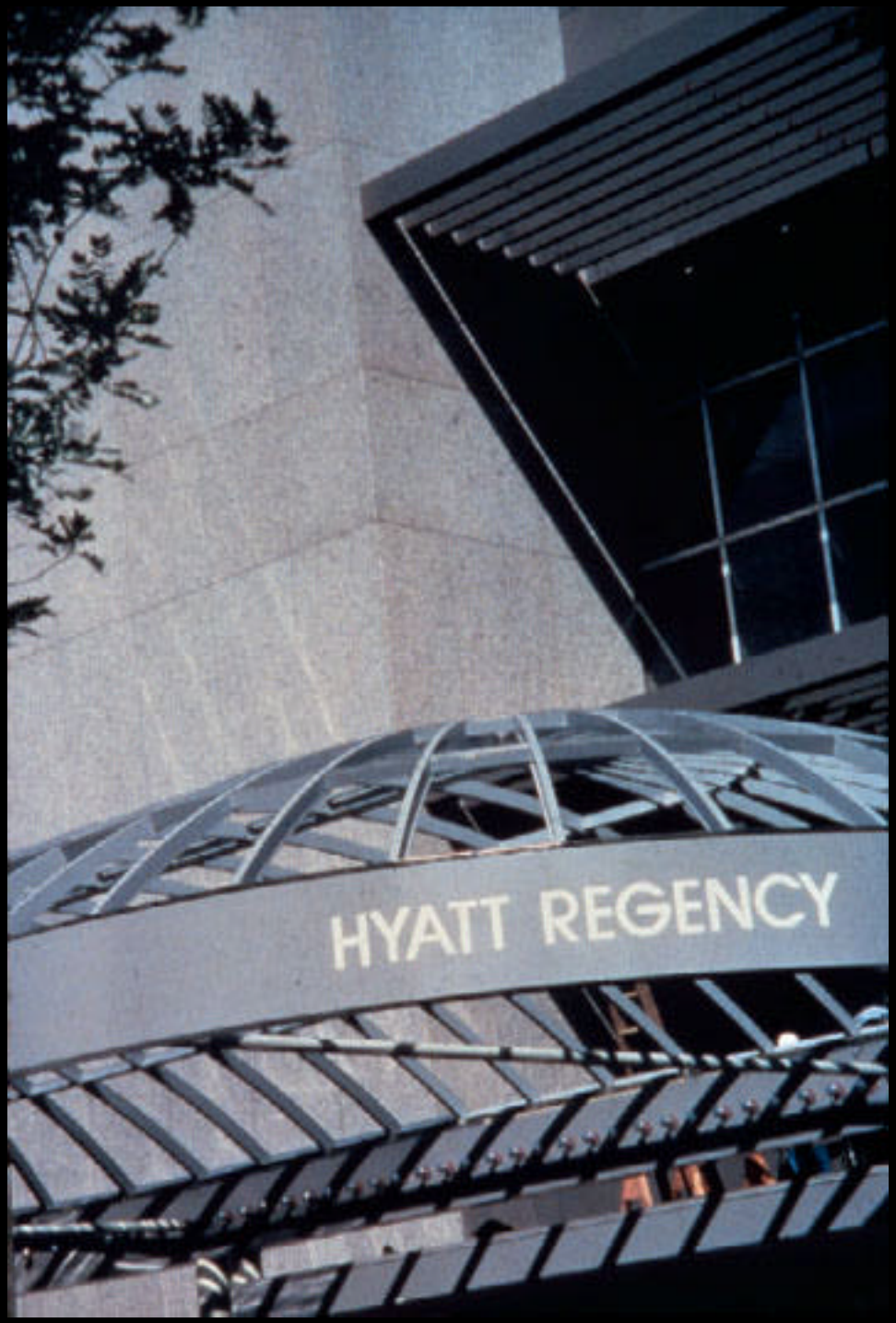
KANSAS CITY, MO • JUNE 2001

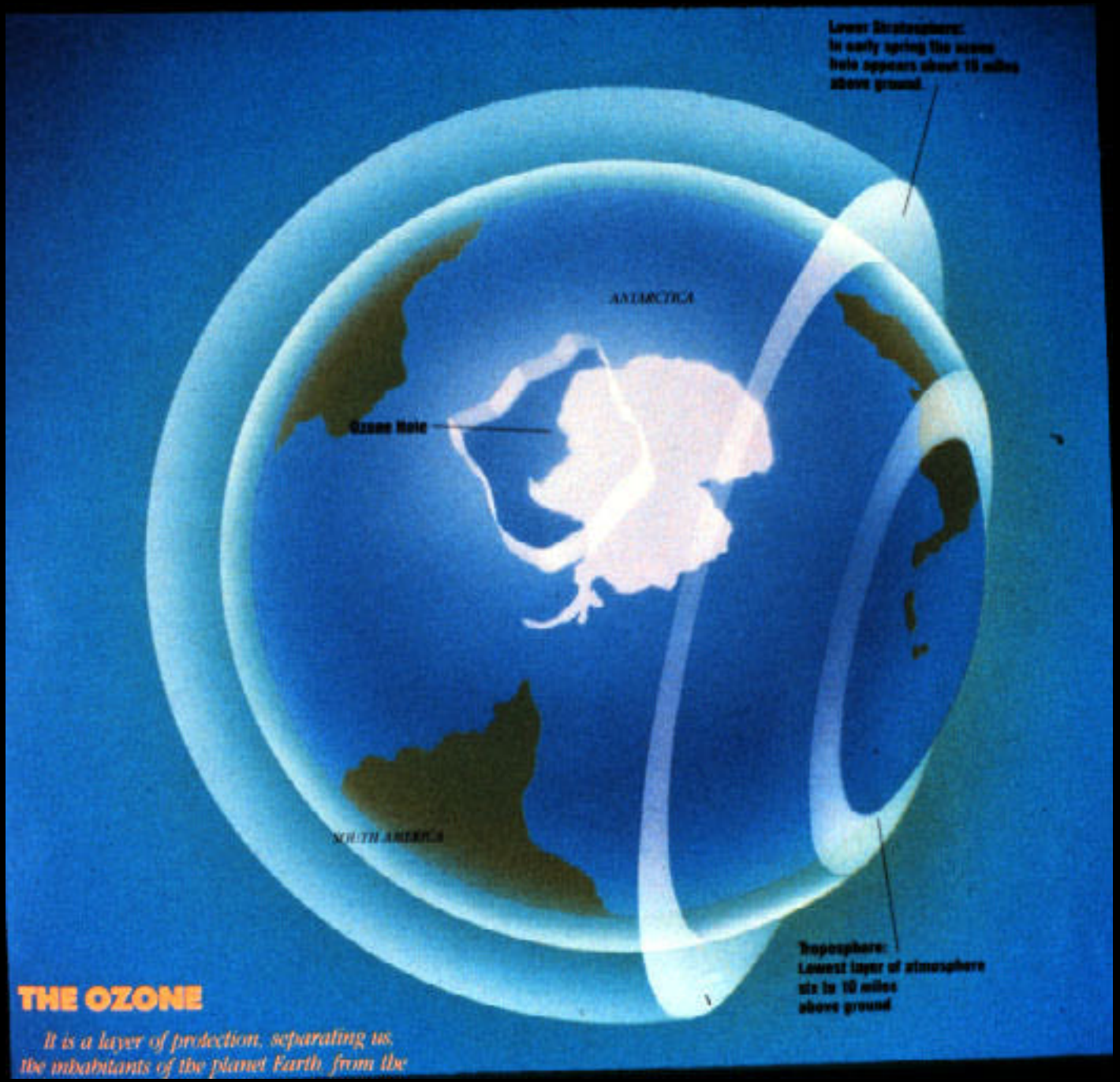
Federal Energy Management Program, United States Department of Energy


BNIM
berkebile nelson immenschuh mcdowell architects
Presented by Bob Berkebile, FAIA


FOLLY

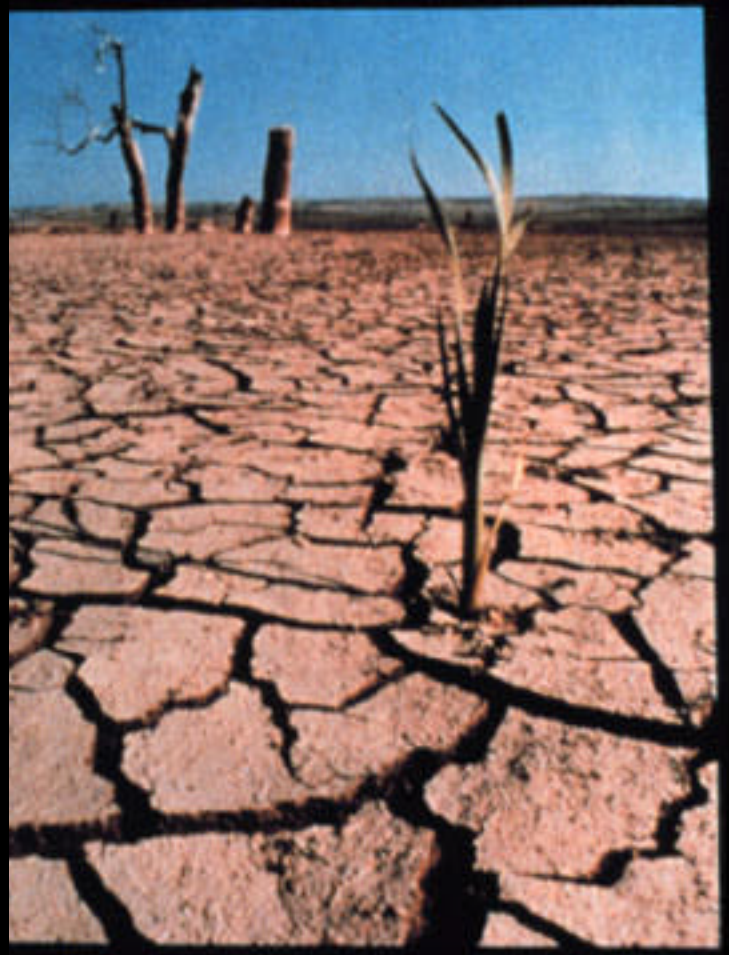

EASE
343


HYATT REGENCY



THE OZONE

It is a layer of protection, separating us, the inhabitants of the planet Earth, from the



NMB BANK

Cost:	$700,000
Measures:	Daylighting, HVAC, overall building system
Energy savings/yr.:	$2.6 Million
Productivity:	Absenteeism down 15% New Image for Bank

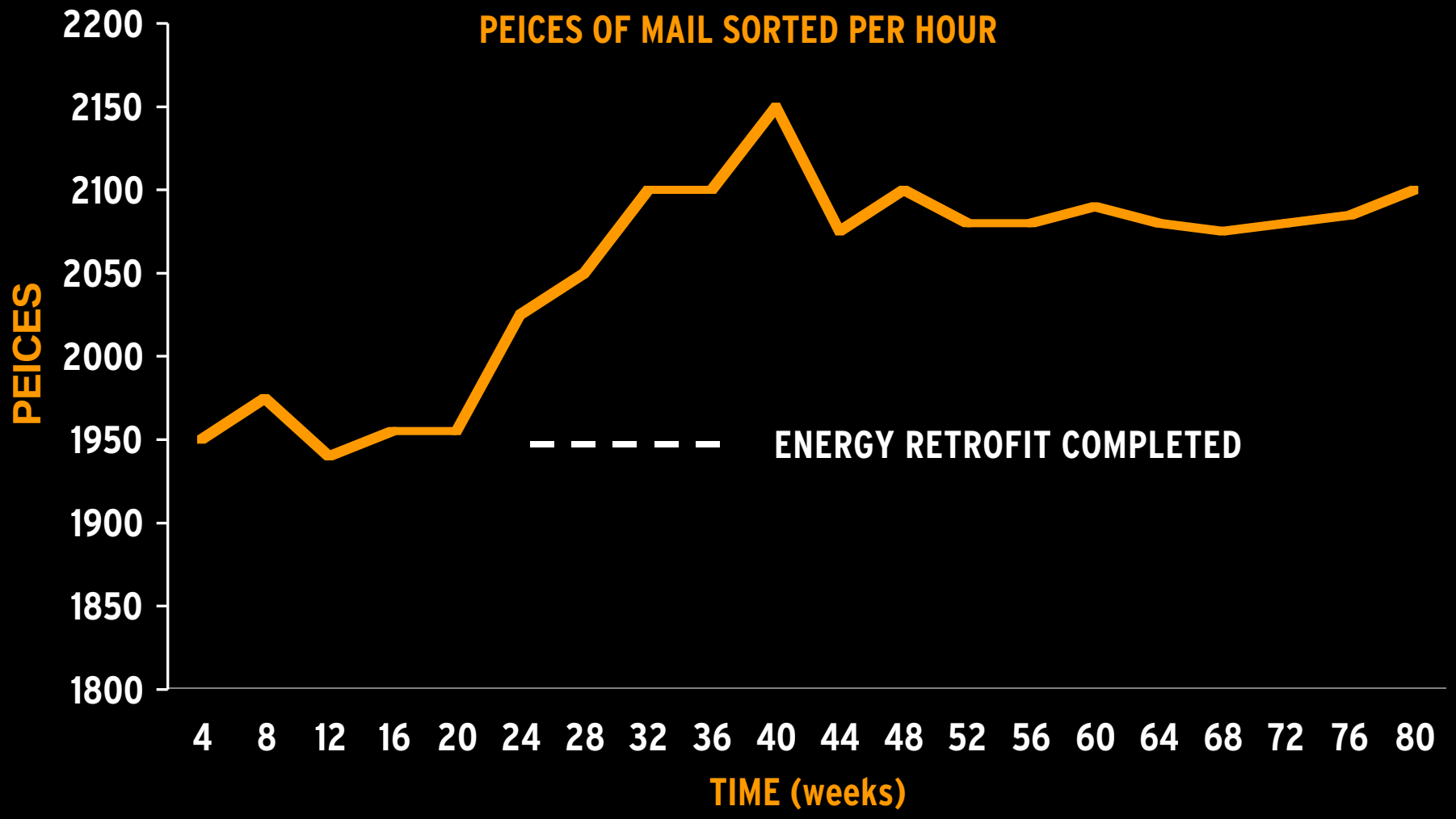
LOCKHEED BUILDING 157

Cost:	$2 Million
Measures:	Daylighting Energy Efficiency
Energy savings/yr.:	$500,000
Productivity:	15% rise in production Absenteeism down 15%

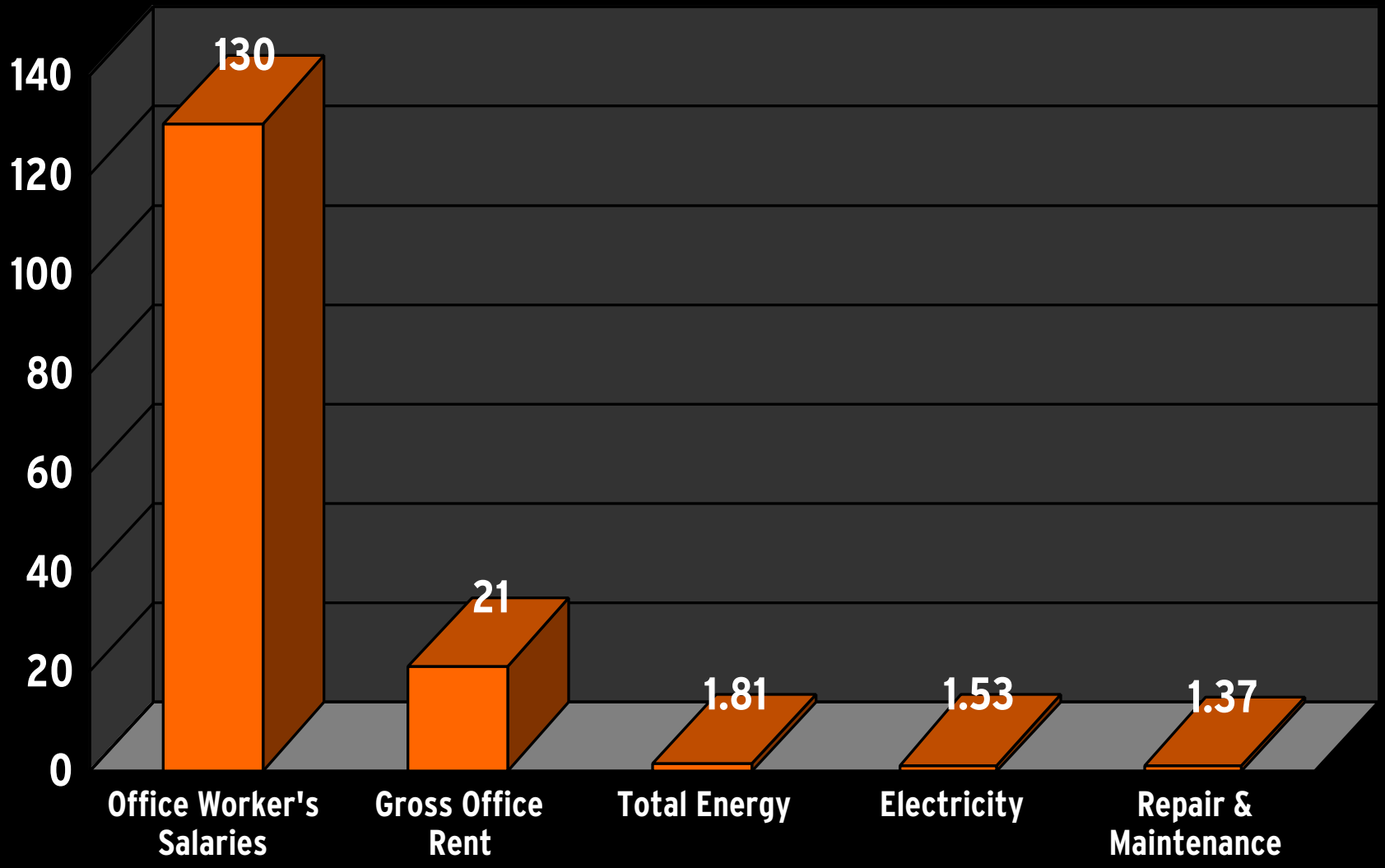
RENO POST OFFICE

Cost:	$300,000
Measures:	Lighting Retrofit New Ceiling
Energy savings/yr.:	$22,400
Productivity:	6% increase in processing rate. One year payback.

Productivity Rise from Energy Efficient Design



COMPARATIVE COSTS

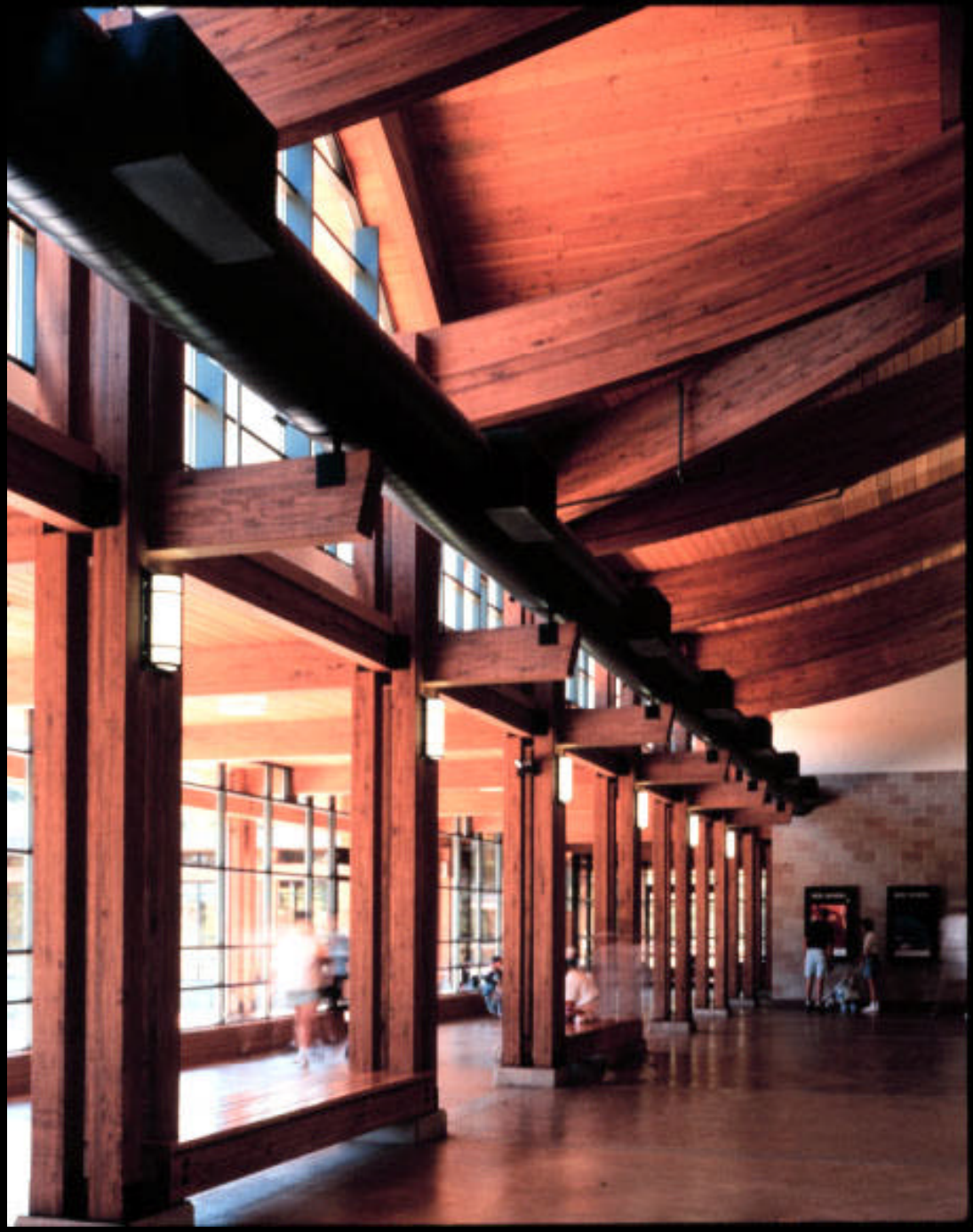



Spotlight will shine on town
A GREEN REBIRTH
Town looks forward
Metro/REGION
Residents get first pee
at design of Pattonsbu
New Pattonsburg could be national model for
could yield
GOP conflict
Town looks
to new life away
from flood plain
Town sets
a goal for
its new life

"We do not seek to imitate nature, but rather to find the principles she uses."

-Buckminster Fuller


the Journey



BNIM DESIGN APPROACH

- Use nature as the model for design innovations. (It's more a matter of discovery & integration than creation).

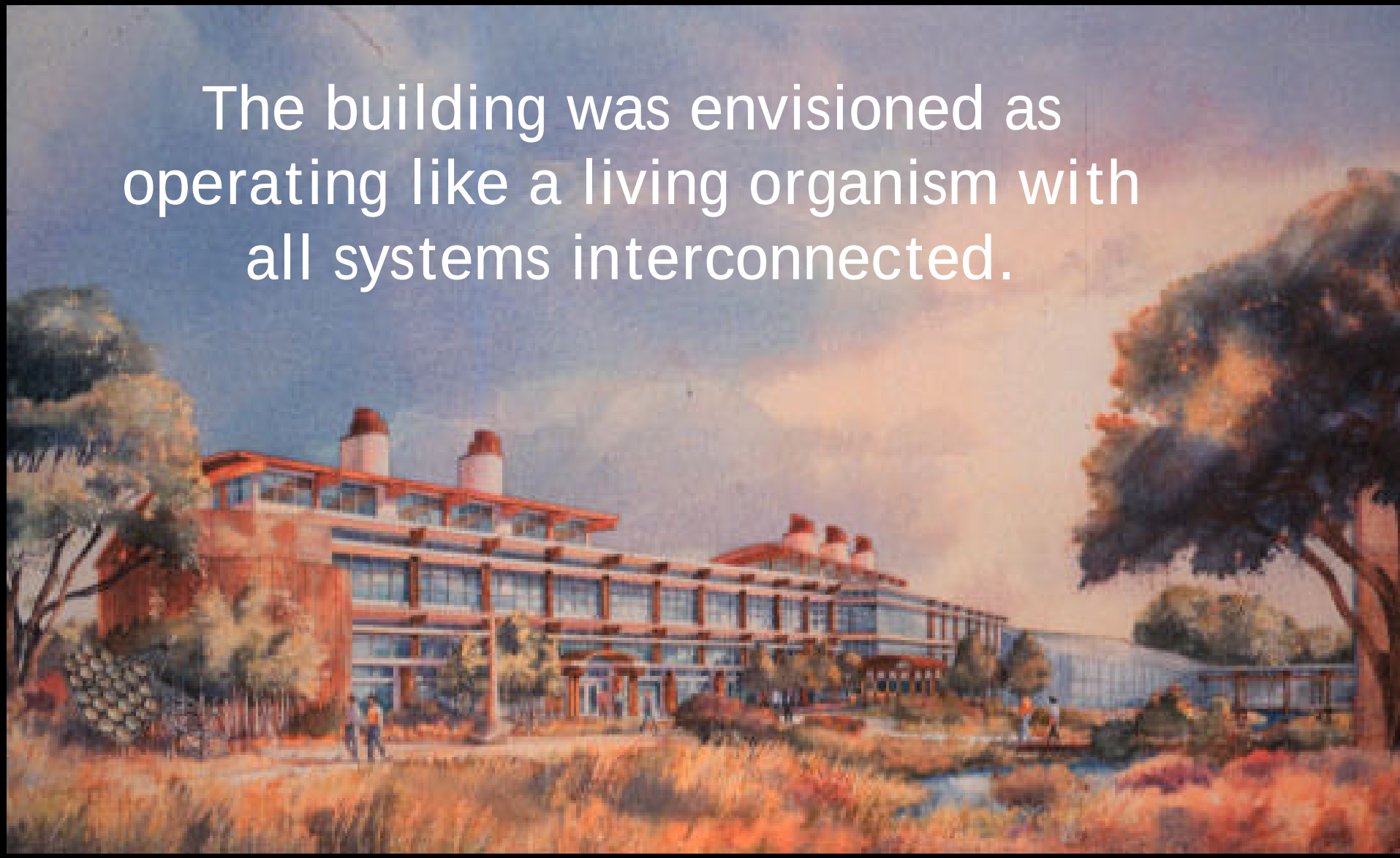
BNIM DESIGN APPROACH

- Use collaboration & continuous feedback with stakeholders, the site, designers & specialists.

BNIM DESIGN APPROACH

Test each concept with the following questions:

- Does this concept add to the vitality of the economic, social & environmental systems?
- Is it elegant enough to engage, inform & inspire?


The building was envisioned as
operating like a living organism with
all systems interconnected.

Goals we embrace

Increasing efficiency in flows of information & materials.

Restoring biodiversity at the site and neighborhood.

Improving economic vitality of the community and region.

Promoting human health, well being and productivity.

Setting new standards for energy efficiency and resource conservation–operating energy has priority over embodied energy

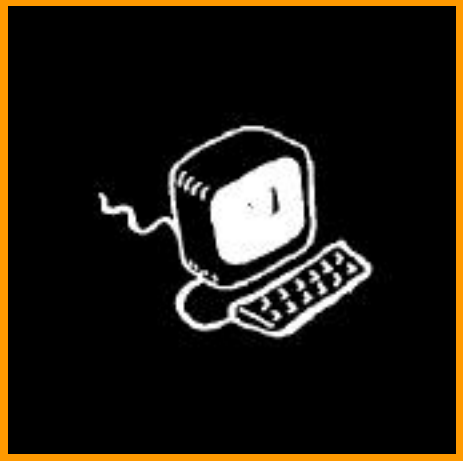
Reducing global warming, ozone degradation & acid rain by increasing efficiency, restoring biodiversity and reducing the release of contaminants.

Improving tools for designing, constructing, operating and evaluating buildings.

Exploring potential of human resources (through education and empowerment) as a major factor in environmental performance, human health and economic productivity.

Expressing “Firmness, commodity and delight” in the spirit of the region so that the user/visitor can “Feel it through the skin.”

Maximizing the pedagogical opportunities of the process and facility.



INCREASE EFFICIENCY IN FLOWS OF INFORMATION & MATERIALS

Therefore:

Measure transfer of information and technology in increments of thousands of miles.

Measure the transportation of materials and equipment in increments of tens of miles.

New Materials Diagram

A N A

BOZEMAN

O M

W

SYSTEMS

cooling

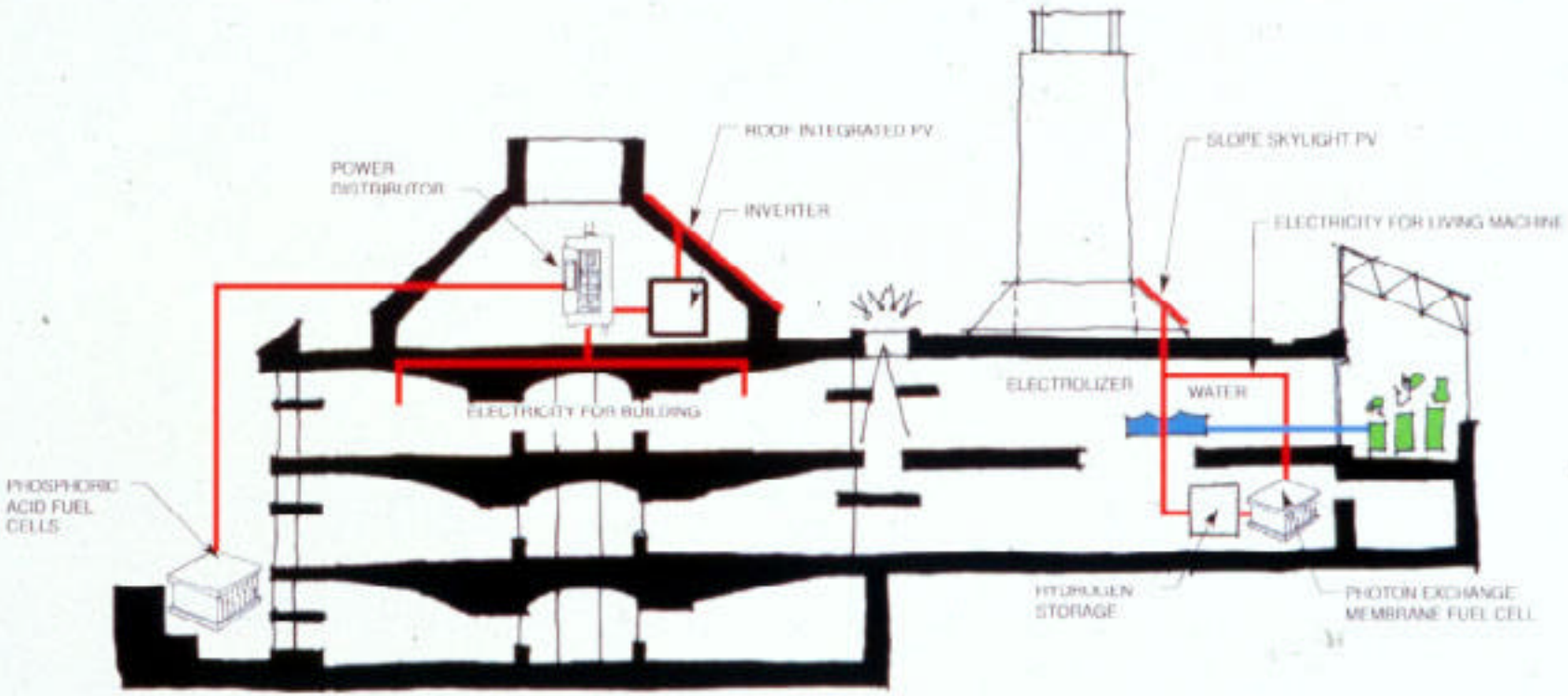
lighting

PLUS ULTRA (MORE BEYOND)

DESIGN APPROACH AT MSU

- Beyond the collaborative integrated design model, ask the following questions:
  - Identify state-of-the-art in every aspect of the project.
  - Identify the barrier to improving state-of-the-art.
  - Develop a strategy for removing barriers and advancing state-of-the-art by exploring connections between natural systems and new technology.

- Review how enhancing one system influences the integrity and performance of the whole.

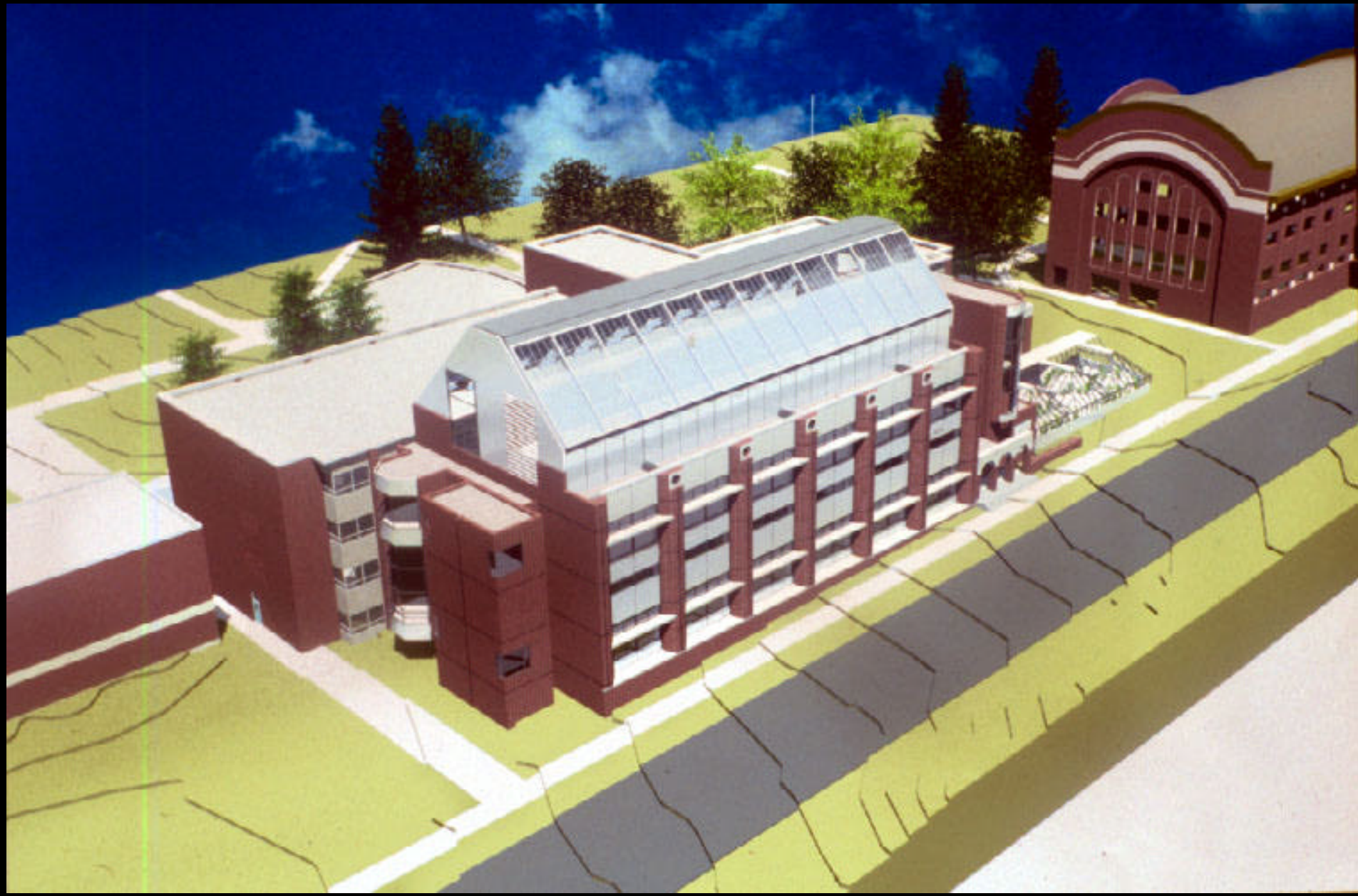


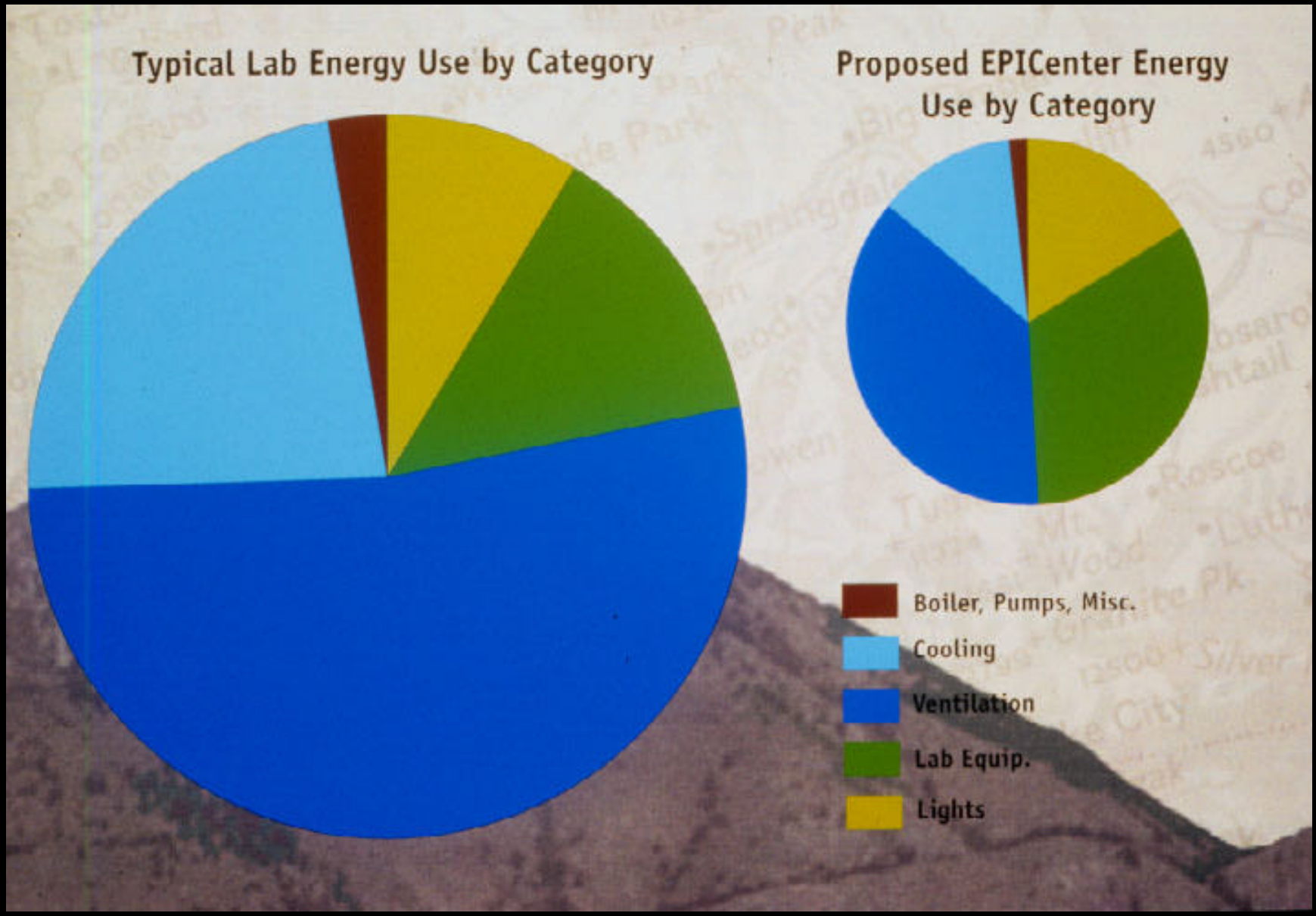
ELECTRICITY GENERATION

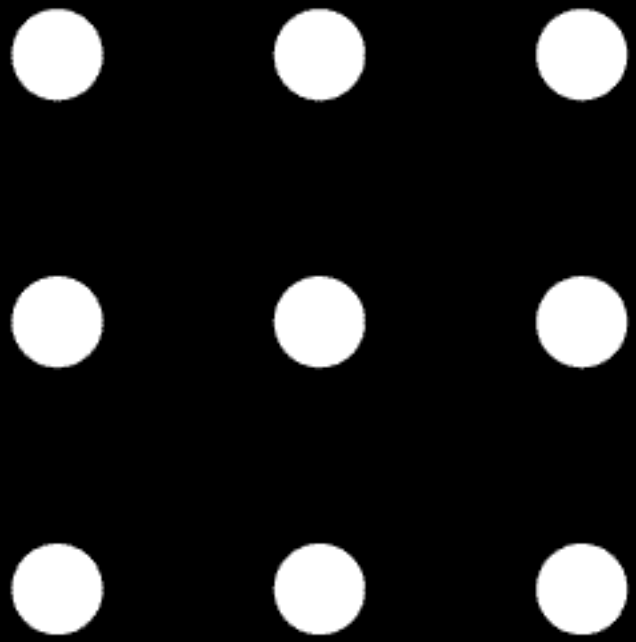
It is our goal at the EPICenter to design a building that gets all of its electricity requirements from non-conventional, environmentally sensitive technologies. The EPICenter will demonstrate the viability of these systems while helping to advance state of the art in electricity generation and building integration.

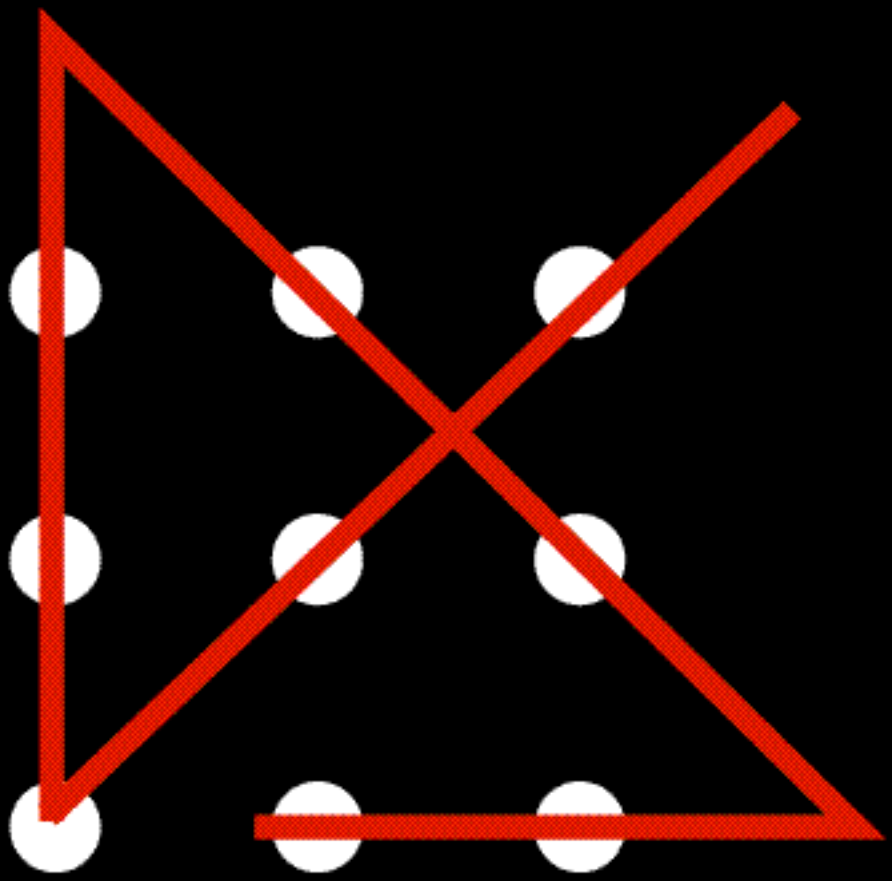
Currently Bozeman receives a majority of its power from coal which produces a great deal of environmental pollutants. The environmental impact of the building will be greatly reduced by the addition of solar panels and fuel cells which do not rely on combustion to generate electricity.

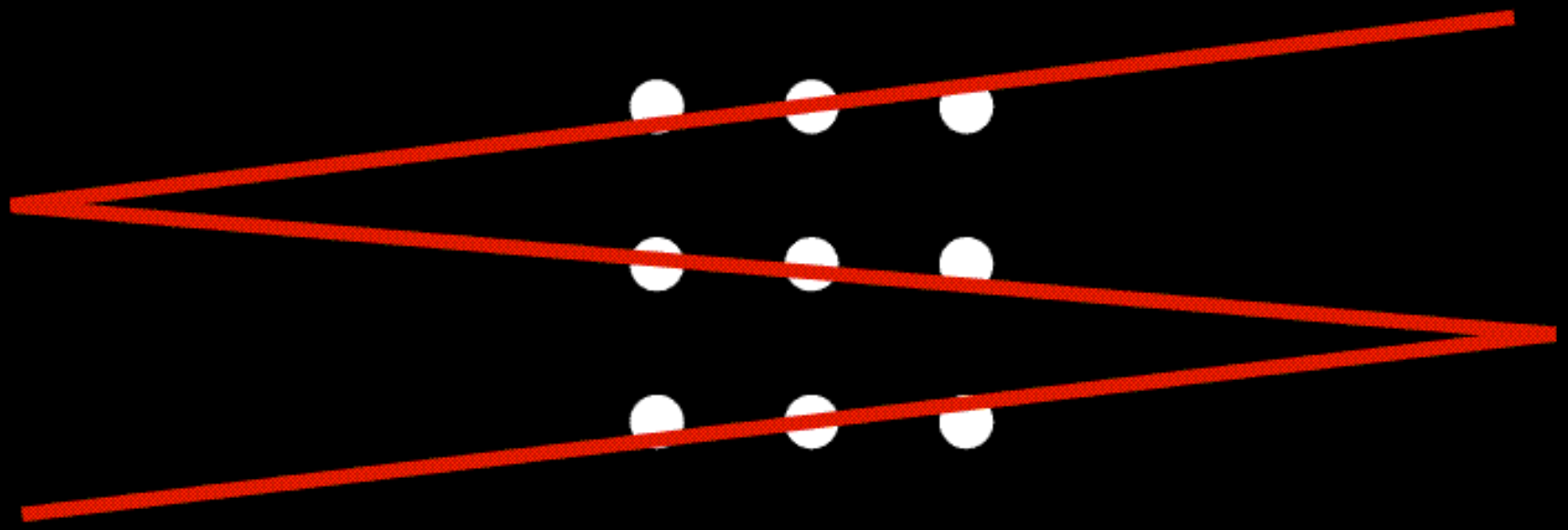
The majority of electricity demand in the EPICenter will come from phosphoric acid fuel cells located outside the building. These 200-250 kW units will supply approximately 80-90% of the buildings electricity needs (see technology sheet). In addition, these fuel cells will generate great amounts of waste heat which can be used for hot water needs in the building.

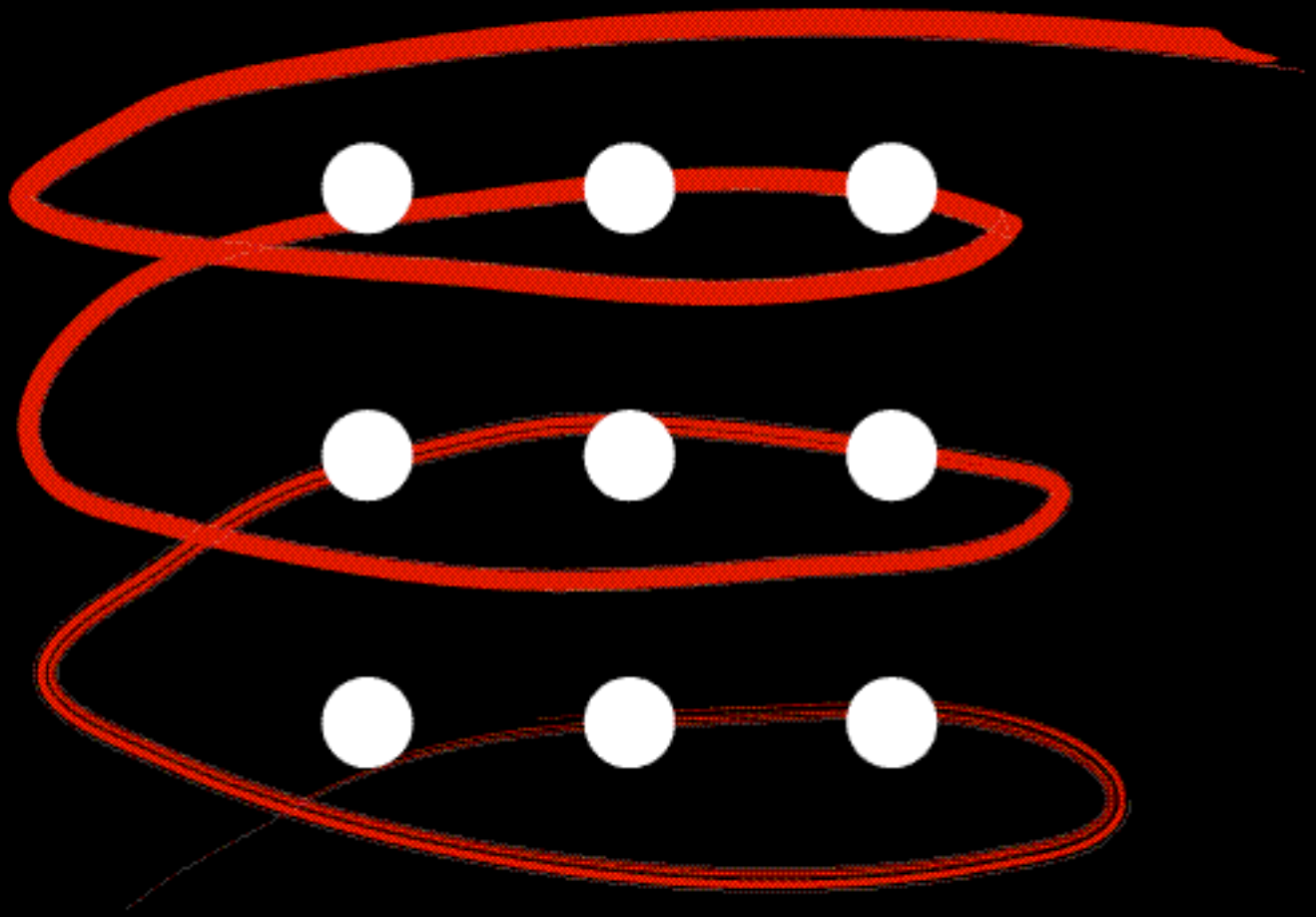


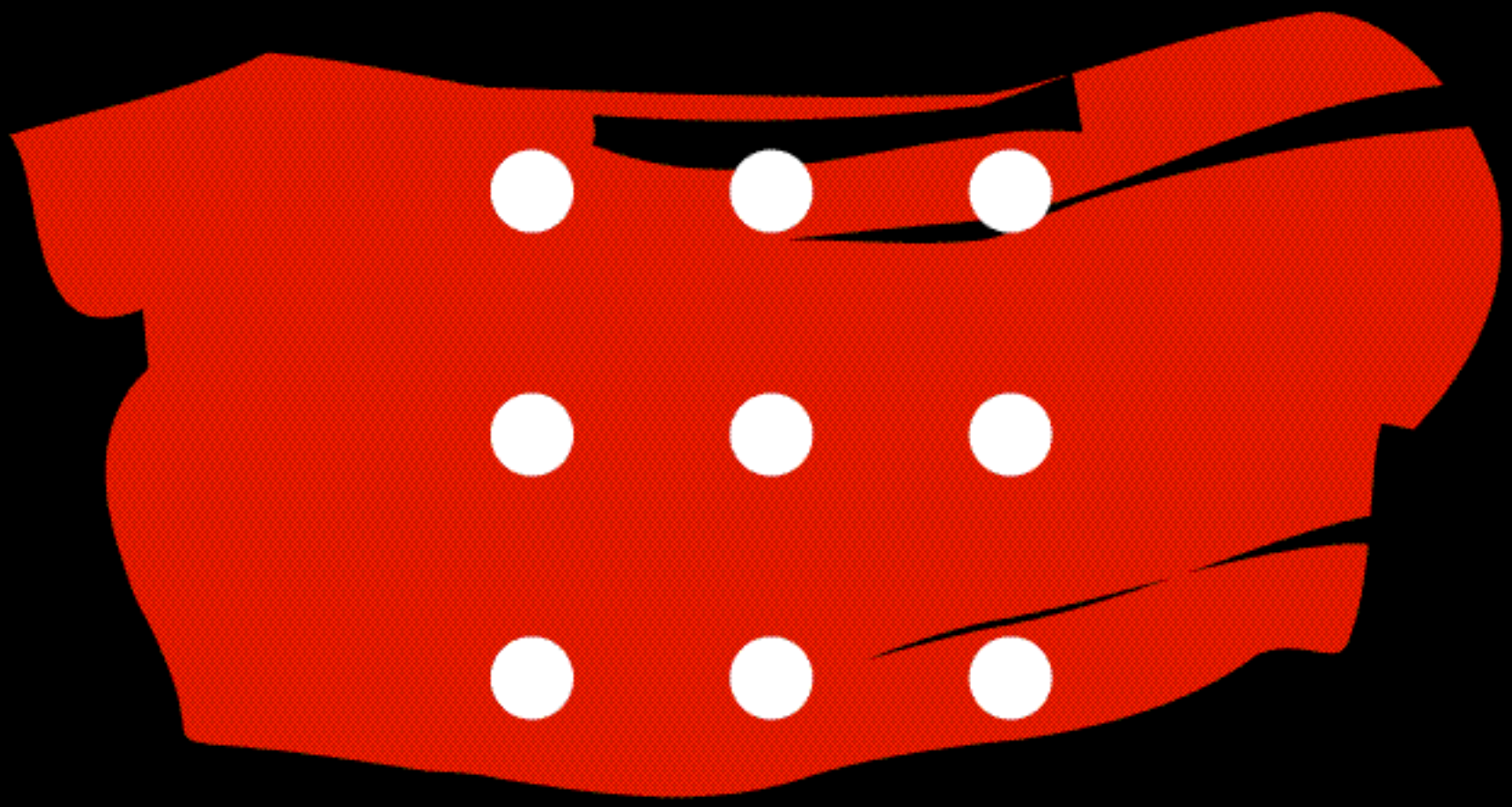

Typical Lab Energy Use by Category
Proposed EPICenter Energy Use by Category
Boiler, Pumps, Misc.
Cooling
Ventilation
Lab Equip.
Lights

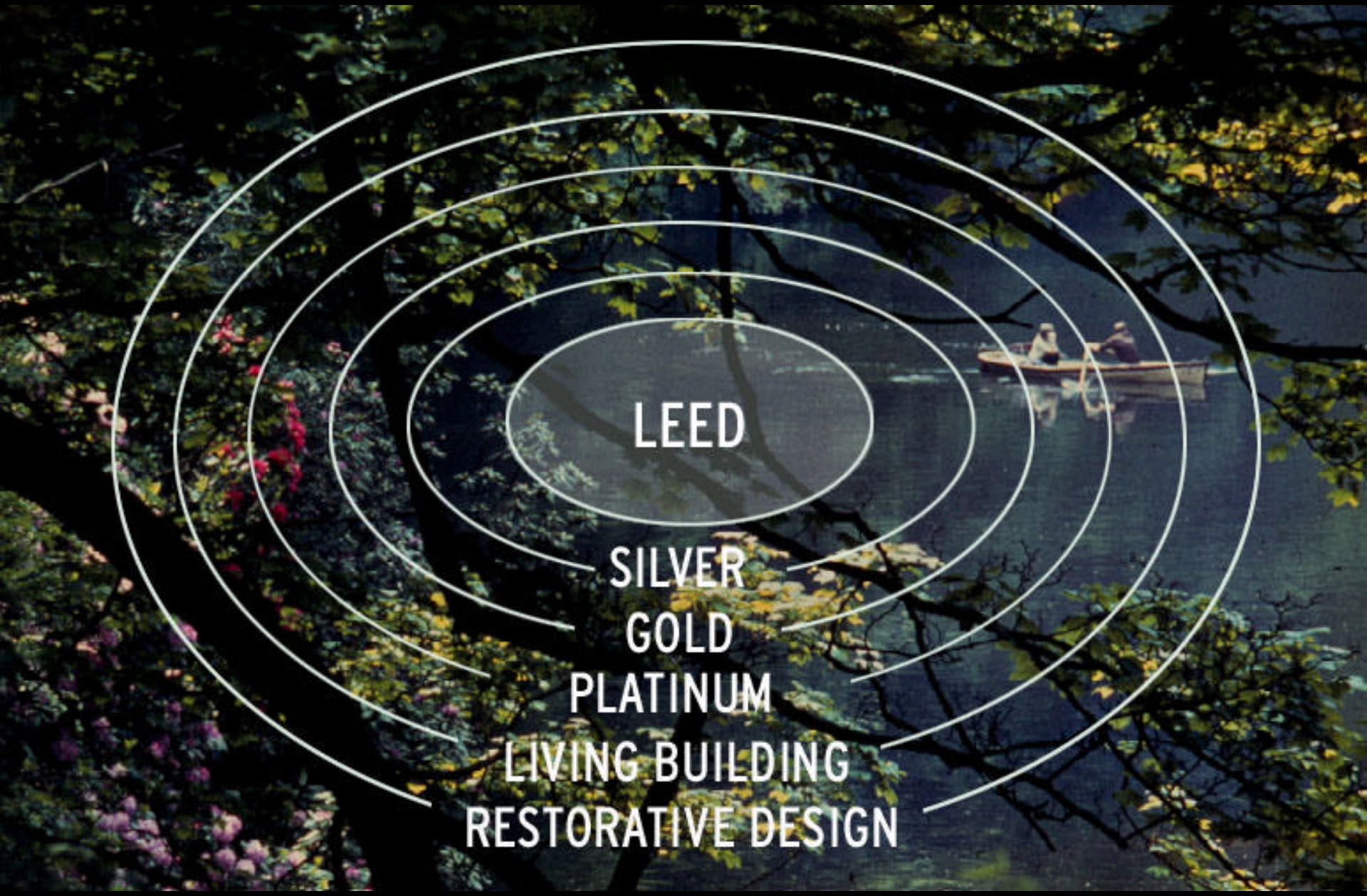


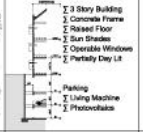
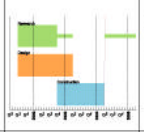
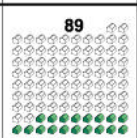
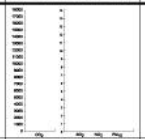
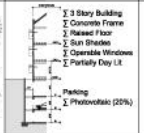
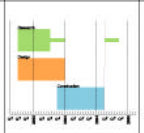
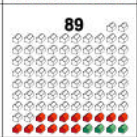
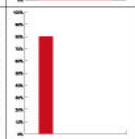
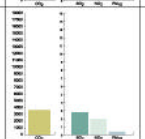
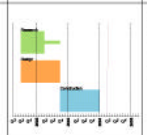
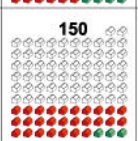
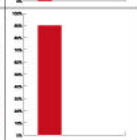
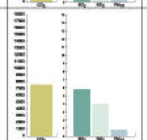
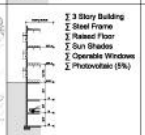
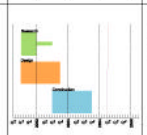
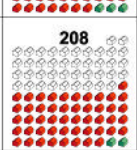
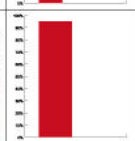
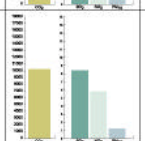
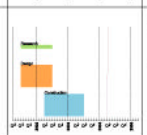
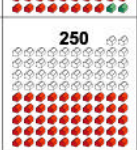
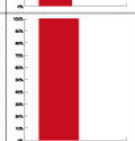
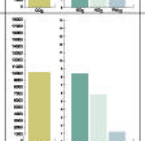
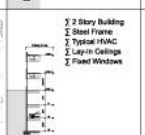
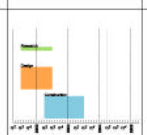
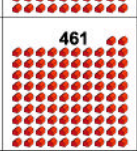
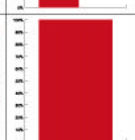
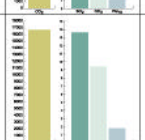


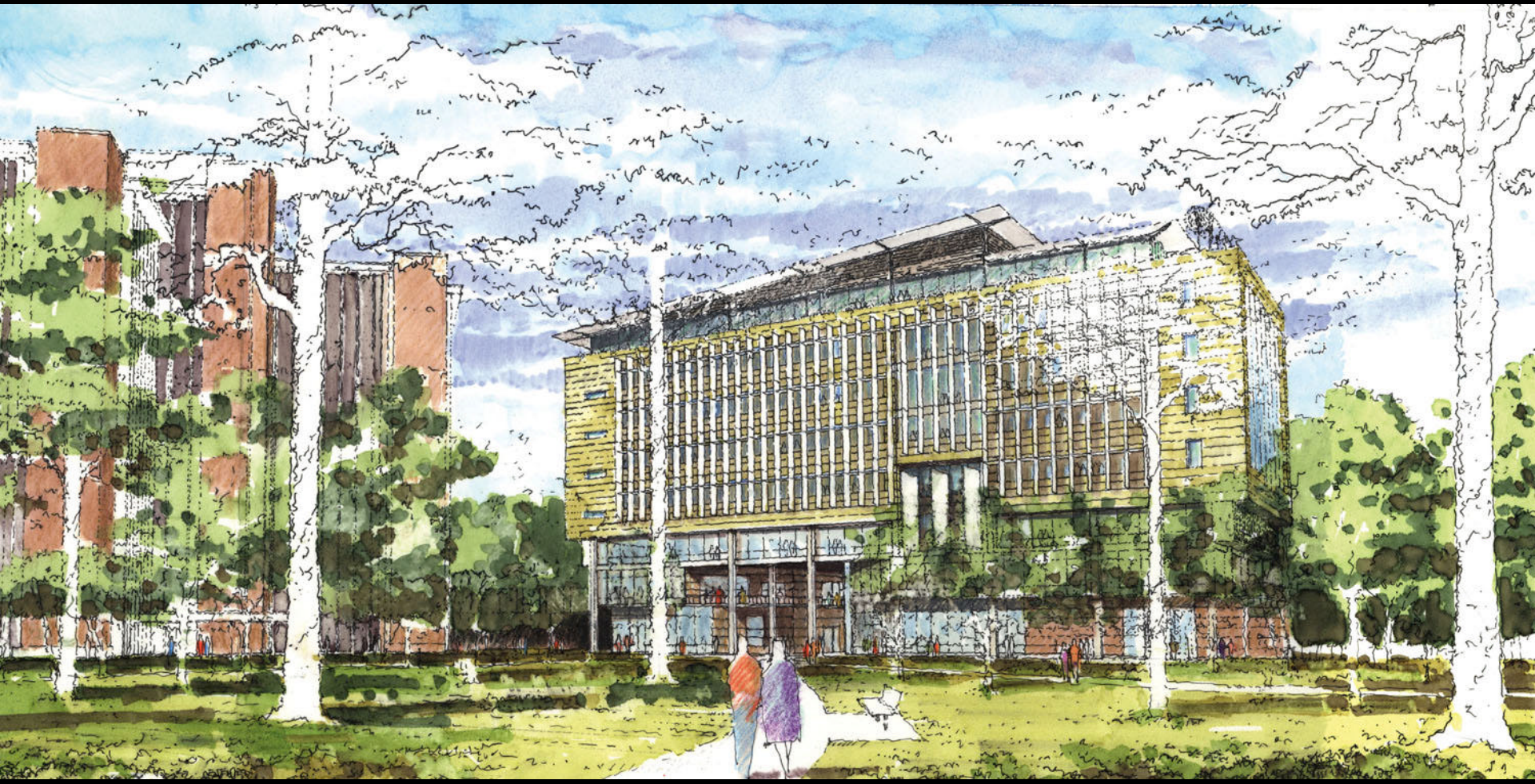




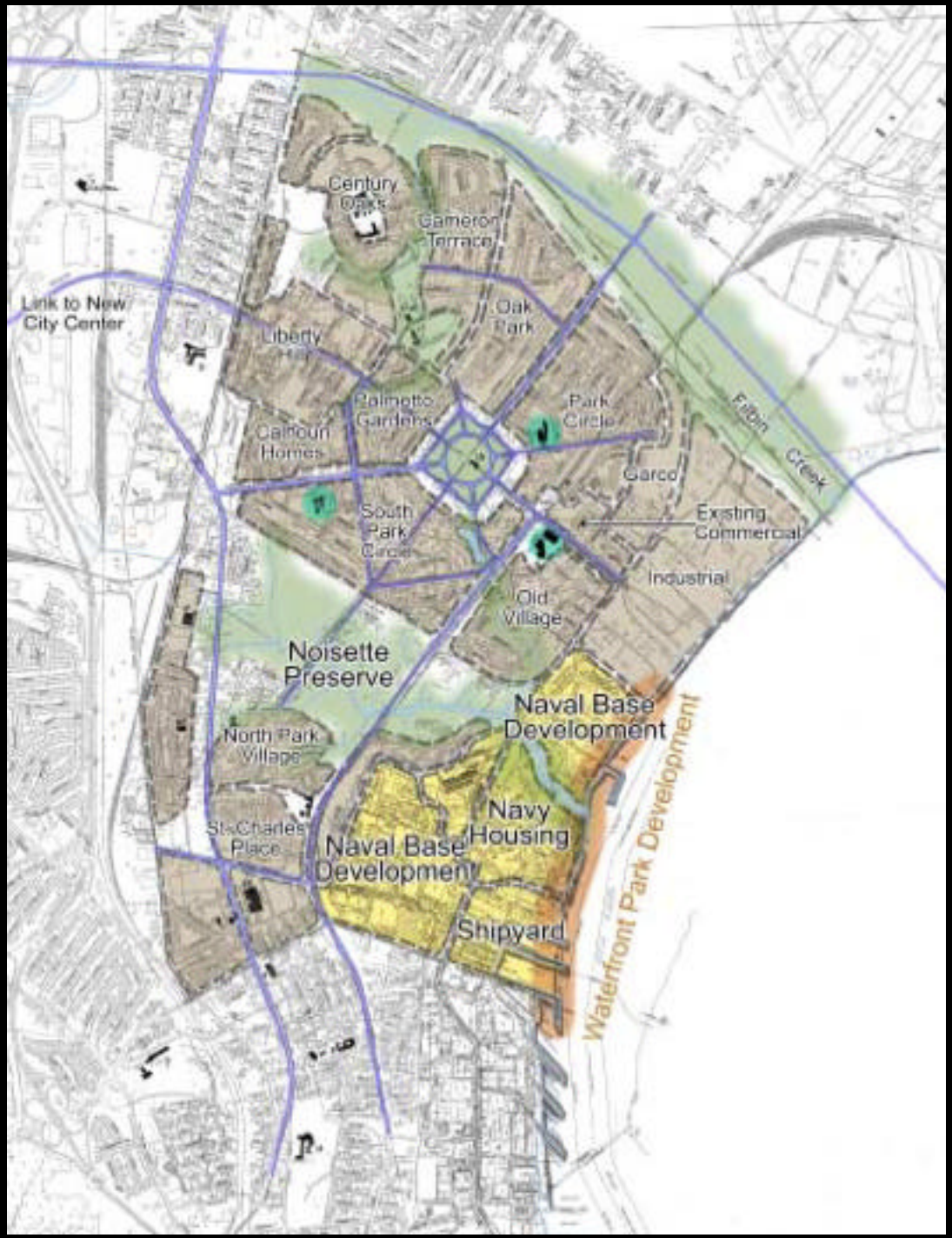



LEED
SILVER
GOLD
PLATINUM
LIVING BUILDING
RESTORATIVE DESIGN

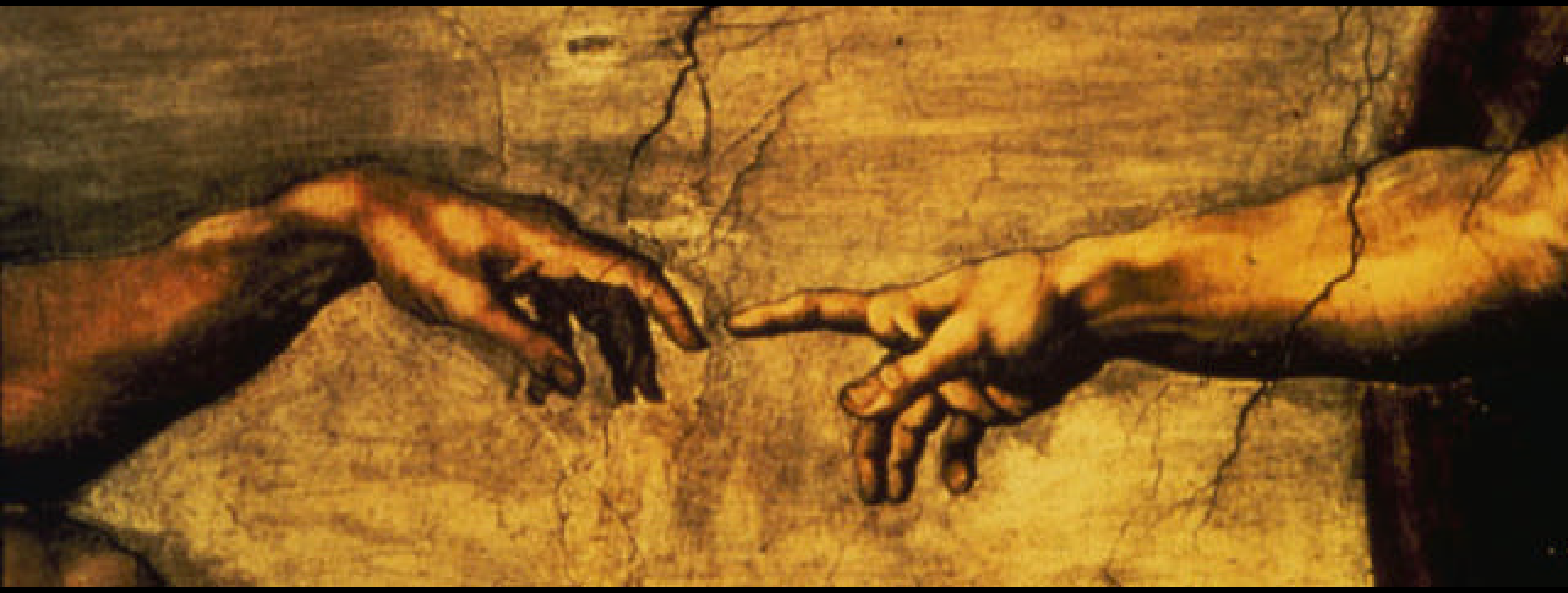
	Plan	Wall Section	Construction Cost	FF&E / Design Fees	Schedule	Workplace Attributes	Energy to Operate Building	Grid Reliance	Pollution (20 yr.)	External Cost to Society (20 yr.)	Net Present Value	Net Present Value
							(1) = 5 Households = Energy Consumed by the Bldg. = Energy Produced by the Bldg. = Energy Saved by the Bldg.		[ ] = Carbon Dioxide (tons) - Global Warming [ ] = Nitrogen Dioxide (lbs.) - Smog		Energy Cost 50% 1st Year 3% Annual 30 Year Model 60 Year Model 100 Year Model	Energy Cost 55% 1st Year 5% Annual 30 Year Model 60 Year Model 100 Year Model
Living Building 100 Year Building 40' Wings Solar Orientation Natural Daylighting Natural Ventilation Living Machine			$59.0 m	$19.0 m		∑ Workplace Recycling Required ∑ Greater Temperature Ranges ∑ More Flexible Workspace ∑ User Comfort Control ∑ On-Site Waste Water Treatment ∑ Photovoltaics	89 			$0	$82.8 $86.2 $89.9	$82.8 $86.2 $89.9
LEED Platinum 100 Year Building 40' Wings Solar Orientation Natural Daylighting Natural Ventilation			$55.5 m	$17.5 m		∑ Workplace Recycling Required ∑ Greater Temperature Ranges ∑ More Flexible Workspace ∑ User Comfort Control ∑ Treatment and Re-Use of Non- Potable Water ∑ Photovoltaics	89 			$.7 m	$81.9 $93.7 $129.8	$85.7 $124.9 $415.0
LEED Gold 80 Year Building 60' Wings Solar Orientation Natural Daylighting			$52.5 m	$16.3 m		∑ Workplace Recycling ∑ Greater Temperature Ranges ∑ More Flexible Workspace ∑ User Comfort Control ∑ Highly Efficient HVAC ∑ Photovoltaics	150 			$1.4 m	$77.8 $91.7 $138.2	$82.4 $128.3 $472.5
LEED Silver 60 Year Building 60' Wings Natural Daylighting			$48.0 m	$14.2 m		∑ Workplace Recycling ∑ Greater Temperature Ranges ∑ More Flexible Workspace ∑ Photovoltaics	208 			$2.0 m	$79.2 $116.2 $213.7	$90.0 $203.7 $1,011.8
LEED Certified 40 Year Building Big Box			$44.0 m	$13.0 m		∑ Workplace Recycling Heavily Encouraged	250 			$2.5 m	$79.9 $131.2 $260.6	$93.9 $244.8 $1,296.9
Market 30 Year Building Big Box			$42.0 m	$12.0 m			461 			$3.2 m	$100.6 $153.7 $316.2	$118.5 $298.5 $1,636.3



NORTH CHARLESTON


Century Oaks
Cameron Terrace
Link to New City Center
Liberty
Oak Park
Palmetto Gardens
Park Circle
Calhoun Homes
Garco
Filbin Creek
South Park Circle
Existing Commercial
Industrial
Old Village
Noisette Preserve
Naval Base Development
North Park Village
Navy Housing
St. Charles Place
Naval Base Development
Shipyard
Waterfront Park Development

Regenerate, reweave + strengthen the city tapestry.
Respect individuals, community and the environment.



BNIM

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ELEMENTS

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